Acoustical Criteria For The Texas Capitol Complex Master Plan

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ABSTRACT

The Capitol Complex surrounding the (US) State of Texas Capitol Building is being redeveloped by the Texas Facilities Commission (TFC). Master Planning by Page/ Architects covers 20 blocks in three phases, followed by future redevelopment of up to 16 more. Except for existing office and historical buildings, demolition and excavation will occur to accommodate new underground parking, conversion of Congress Avenue to a pedestrian mall, and construction of multi-story, mixed-use office buildings. State standards were coordinated with city codes. Comprehensive criteria and standards for acoustical, noise, structural vibration and environmental noise were developed for the TFC Owner's Project Requirements (OPR) and the Master Plan architectural and engineering design standards. Narrative guidelines were recommended for implementation.

The Master Plan covers space uses, infrastructure, traffic and building plans with considerations for historical compatibility, sustainability and security. Architects of Record will be retained for detailed design and construction documentation for each major building. The Acoustical Criteria and Guidelines are mandated for all types of building designs throughout the Capitol Complex redevelopment. The Phase I Central Utility Plant, Congress Avenue Mall, underground garage and two large office buildings are in design.

The Texas Capitol Complex Master Plan, completed in 4Q-2017, is summarized with Acoustical Criteria in this presentation.

1 INTRODUCTION

Texas has an area of 695,663 km^2 (268,597 mi^2), the US's second largest after Alaska. The population of 28.3 mil (2017)[1] is also second after California, but only 29th in density. Of the 50 largest cities in the US, 7 are in Texas, with Houston, Dallas, San Antonio and Austin, 4 of the 12 largest[2]. In 3Q, 2017, Texas' economic gross domestic product (GDP) of $1.706 Billion was second after California and between the sizes of Brazil and Canada (2015 GDPs), or 10th largest internationally[3]. Even though Texas is generally thought to be a "small-government" state[4], it still requires a large bureaucracy to administer the laws, policies and programs of the state.

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There are state offices and other facilities throughout Texas, but the largest concentration is within the capitol city of Austin. Many state office buildings are in the vicinity of the Capitol building, which is between the downtown Austin central business district (CBD) and the large University of Texas flagship campus institution. Many of the state-owned properties in the area are relatively underutilized. Meanwhile, state offices are located in 22 lease facilities, comprising over 140,000 gross square meters (gsm) or 1,500,000 gross square feet (gsf) in other parts of the city, remote from the Capitol, to accommodate some 5,000 employees of various agencies and departments. The 83rd Texas Legislature directed the Texas Facilities Commission to develop a Master Plan to consolidate facilities and government employees through redevelopment of the properties near the Capitol. It commenced under appropriation of the 84th Legislature for Phase 1; 92,225 gsm (1,025,000 gsf) of new office space, a Texas Mall surface conversion of Congress Avenue with 4,840 subterranean and building vehicle parking spaces, plus infrastructure improvements and additions to serve the Complex[5]. Additional Phases 2 and 3, included in the Master Plan, will follow under separate appropriations. This new process follows facility efficiency and consolidation trends dating back to 1941 and 1955 legislative plans.

The 2016 Texas Capitol Complex Master Plan (TCCMP) Introduction states, "As mandated by Texas Government Code, Section 2166.105, the Texas Facilities Commission … addresses the strategic vision and long-term goals for the Capitol Complex and the extent to which Texas is able to satisfy its space needs through use of state-owned property in the complex. The Texas Capitol Complex Master Plan provides detailed, site-specific proposals for use of the property to meet the space needs of state agencies and for public sector purposes; *recommendations for building design guidelines* (emphasis by author); recommendations for infrastructure needs; analysis and recommendations for financing options; time frames for implementation of the plan; alternative options for meeting state agency space needs outside the Capitol Complex…"[6].

The Texas Facilities Commission commissioned Page Southerland Page (Page) Architects to do the master planning process with engineering and other consultants, including this author, with participation and contributions of other state boards and commissions. View the Master Plan at: http://www.tfc.state.tx.us/divisions/commissionadmin/tools/2016.03.23_TexasCapitolComplexMasterPlan_ADOPTED.pdf

Fig. 1 – Texas Capitol and Capitol Complex Master Plan Aerial Perspective Rendering[7].

Goals and design principles for the Capitol Complex in the Executive Summary include:

- Provide state office space and support facilities for short-term and long-term needs.
- Create a destination that celebrates the Texas State Capitol and is symbolic of the State of Texas.
- Create civic spaces, pedestrian friendly streets, and appropriately scaled environments ...
- Establish gateways to the Capitol Complex and improve connections with surrounding districts.

2 MASTER PLAN DESIGN GUIDELINES AND DESIGN REVIEW

As stated in the Executive Summary, "Successful implementation of the master plan will require creating a high-quality public realm and architecturally appropriate buildings. To ensure the implementation of the master-plan vision, design guidelines for urban design, landscape architecture, and architecture are part of the master plan. Those guidelines define the principles to be applied when reviewing all projects in the Capitol Complex. Proposed building designs and landscape projects will be reviewed for conformance with the guidelines by the State Preservation Board and the Joint Oversight Committee. They will be assisted by a panel of experts comprised of leaders in the disciplines of architecture and landscape architecture."

2.1 Master Plan and Implementation

The Plan incorporates i) planning and urban design principles, ii) initial design concepts, iii) the Capitol Complex Plan, iv) traffic and parking and v) infrastructure. The Implementation includes sequencing of the Phases, 1-3, and elements (buildings, mall, infrastructure, etc.), plus the financial analysis. New facilities will include Phase 1 Central Utility Plant (CUP) and infrastructure to serve the complex, the Texas Mall and underground parking plus two large office buildings and an outdoor stage venue. Future Phases 2 and 3 will each include two office building plus amenities.

2.2 Design Guidelines

The TCCMP Design Guidelines capture the design intent of the master plan and provide guidance to designers as new state buildings and public spaces are built over time. They provide the State Preservation Board, Joint Oversight Committee on Government Facilities, and Texas Facilities Commission with decision tools and give direction on development of the complex.

The Guidelines sections for i) Urban Design, ii) Architectural Design and iii) Open Space and Landscape Design include several overarching principles, which express the general intent of the plan and desired effect of design decisions. There are instructions outlining specific design requirements, which, together with the principles, will lead to a cohesive, attractive, comfortable, and functional Capitol Complex.

2.3 Basis of Design - Criteria and Standards

To complement the Master Plan, separate documents were created by the architectural design team, which includes architects, landscape architects, engineers and other consultants. Based on a complex pre-design plan and initial building design concepts, each discipline developed criteria, layout, quantities and sizing parameters and other information regarding the different elements of the plan; the mall, central utility plant, office buildings, outdoor event venues and interior amenities. The information was intended to be complete and reliable for the purpose of general finance and cost estimating. The Plan creates a unified design organization that later architects and engineers of record for individual buildings or other Capitol Complex elements will conform to in detailed design and preparation of construction documentation.

The Acoustical Criteria for i) architectural acoustics and privacy, ii) noise and vibration control and iii) environmental noise was a sub section of Architectural Design Standards, although segments necessarily covered or influenced landscape architecture (outdoor venues) and structural, mechanical, plumbing and electrical engineering, including low-voltage audio, visual, data and communications systems for the complex. Environmental noise criteria considered facility noise crossing property boundaries and outside to inside sound transmission from external sources.

2.4 Acoustical Criteria and Guidelines as Basis of Design

Architectural, engineering and consulting (AEC) design disciplines should consider acoustics, noise and vibration in analysis, planning and design. Acoustical Criteria for Architectural Acoustics and Building Systems cover a range of conditions including: a) room acoustics reverberation and reflections, b) sound isolation/privacy, c) continuous background noise, d) intrusive and transient events, e) environmental noise crossing property boundaries and transmitting into buildings and f) building impacts and vibration.

Acoustical, noise and vibration, structural vibration and environmental noise criteria were submitted to the Master Plan team with narrative descriptions and tables of limit values,[8] for inclusion in the Master Plan, with the intent that they be implemented by Architects and Engineers of Record to be selected later for their designs of individual building projects. They are presented herein with limited editing. Narrative Guidelines were also submitted to complement the Criteria with commentary and conceptual implementation recommendations[9]. Due to length of the document, the guidelines may be covered in a future paper, but are not presented here.

3 ARCHITECTURAL ACOUSTICS

3.1 Room Acoustics Reverberation & Reflections

Room Acoustics relates to reverberation, reflection patterns, and/or noise build-up within an enclosed space. Reverberation Decay Time (T60, the time required for sound to diminish 60 dB)[10] is the criteria in Table 1 for spaces where speech intelligibility over a distance is a primary consideration, such as auditoria/presentation and conference or teaching/training spaces. In large lobby and/or atrium spaces, reverberation contributes to noise build-up and "boomy" or "brassy" conditions and amplifies transient noise events. In smaller spaces, reverberant noise build-up (spatial decay, dB/ft) and reflection patterns are of more relevance than reverberation decay time. Disturbing sound reflections, such as those from 90° corners and flutter echoes between parallel surfaces, should be avoided if speech intelligibility is of concern or microphones are used to record or transmit. These concerns are magnified for audio recording or teleconferencing rooms.

Table 1 - Reverberation Decay Time (T60)*.

Space Description	Criteria
Atrium, Lobby, Reception Desk	<1.2 sec
Public Assembly Pre-Function	<1.1 sec
Auditorium, >100 seats	<1.0 sec
Large A/V Conference, <100 seats	<0.8 sec
Medium Conference, <50 seats	<0.6 sec
Small Conference, Executive Office	<0.5 sec
Video/Audio Teleconferencing	<0.5 sec

* Time in seconds for sound to diminish 60 dB.

3.2 Sound Isolation & Privacy

Sound Isolation relates to airborne sound transmission between rooms and/or floors, with respect to freedom from intrusive noise as well as speech privacy. Conversely, sound isolation provides source noise containment to minimize transmission to sensitive adjacent spaces. Structure borne vibration and impact transmissions (see 5.3) also contribute to ambient airborne sound.

Acoustical speech privacy and control of airborne noise intrusion via demising assemblies considers: (i) typical source noise levels, (ii) receiving room ambient noise levels, (iii) sound transmission through room envelope and (iv) source and receiver sound spectra. Partitions are rated by Sound Transmission Class (STC)[11], Table 2, a single number laboratory rating system that quantifies sound transmission loss performance across a series of 1/3 octave bands between 125 Hz and 4000 Hz. In-situ or field-measured conditions are rated by Apparent STC (ASTC) or Noise Isolation Class (NIC), which is anticipated to be 5 or more points lower. Ceiling attenuation class (CAC) rates room-to-room noise reduction (2 ceiling passes plus plenum loss).

Table 2 – Sound Transmission Class (STC)*.

Spaces Demised	Criteria**
Atrium, Lobby, Reception Desk	STC 45
Exhibit Spaces (assumes A/V)	STC 50
Public Assembly Pre-Function	STC 50
Auditorium, >100 seats	STC 65
Video/Audio Teleconference	STC 65
Large A/V Conference, <100 seats	STC 60
Medium Conference, <50 seats	STC 60
Small Conference, Executive Office	STC 55
Private Office,	STC 50
Work, Copy, Mail, Utility	STC 50
Break, Lounge, Dining, Reception	STC 55
Fitness Facility with Music Capability	STC 60
Child Care	STC 55
Toilet Block non-plumbed / plumbed	STC 55/60
Elec., IDF, Mech., Elev. Equip Room	STC 60
Server/Digital Equip Room / CRAC	STC 55/65
Floor-Ceiling Demising	STC 50
Ceilings if walls do not extend to deck	CAC 35

* STC is a laboratory rating. In application, field-measured values are normally de-rated 5-10 points.
** Recommended criteria between occupied spaces. Room entry/corridor partitions may be de-rated.

3.3 Transient & Intrusion Event Limits

It is desirable to limit how much transient or intrusive sound events can increase noise levels in rooms. Regardless of whether sound transmits room-to-room, floor-to-floor or outside-to-inside, transient sounds can interfere with speech intelligibility and can be distracting and annoying, as well. Continuous intrusive noise can make allowable noise criteria conformance difficult. Sounds that are tonal, intermittent or modulating (changing with time) increase perceptibility and annoyance distraction.

Continuous or transient broadband sounds should not be permitted to increase room sound level more than 5 dB. Tonal, intermittent and modulating sounds should be limited to 2-3 dB overall room increase.

Determination of noise intrusion conditions should consider maximum source sound level outside room, continuous background sound within room and intrusive spectrum shape, i.e., smooth or with prominent frequency tones.

Outside to inside environmental noise intrusion is related, but considered separately for building façade and shell design, including special glazing specification recommendations for STC values (125 Hz-4000 Hz) with minimum transmission losses in 100 - 200 Hz 1/3 octaves.

4 BUILDING SYSTEMS NOISE & VIBRATION

4.1 Allowable Continuous Background Sound

Continuous Allowable Background Sound Criteria for building systems (MEP/HVAC) noise are published by ASHRAE, a widely accepted and used reference standard, 2015 ASHRAE HVAC Applications, Ch. 48, Table 1, Design Guidelines for HVAC-Related Background Sound in Rooms[12]. Two primary systems, Room Criteria (RC) and Noise Criteria (NC), illustrated in Fig. 2, specify allowable building noise for each audible octave band in graduated levels, exclusive of occupant and user-installed equipment noise, for various room function sensitivities.

Room Criteria (RC; 5 dB/octave slope) are preferred for sensitive spaces with low frequency or speech intelligibility requirements and to specify low frequencies. For less critical spaces, Noise Criteria (NC; curved lines) are acceptable. RC and NC criteria are equal in the 500 Hz band, but more permissive NC curves diverge at lower and higher frequencies. NC curves are also in common use by manufacturers to rate HVAC component noise.

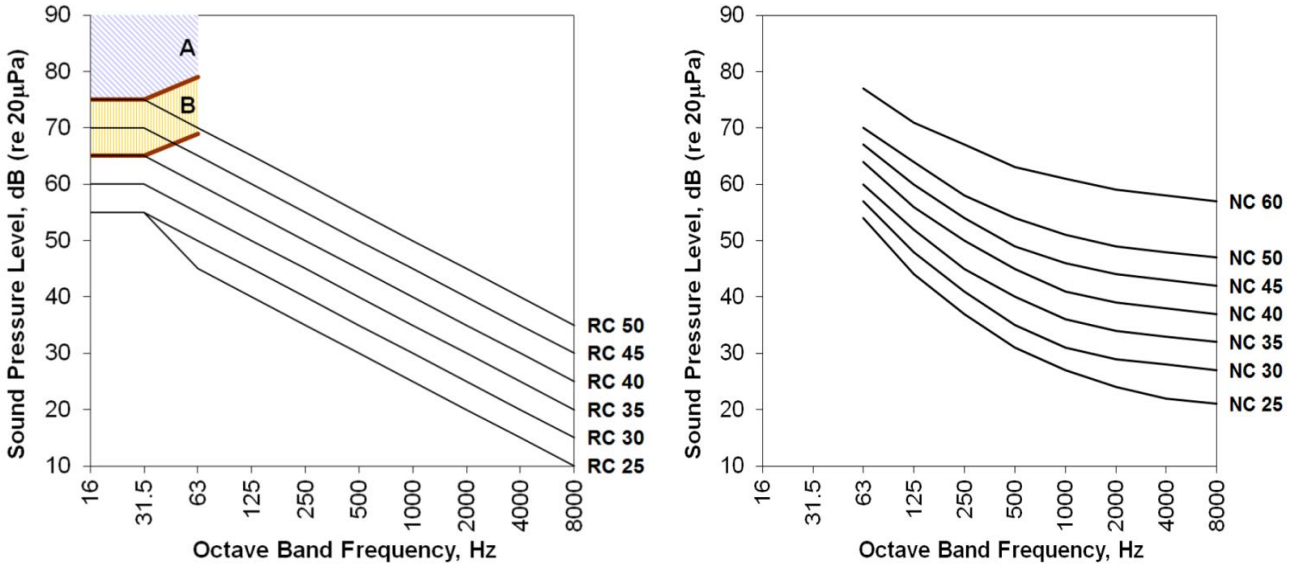

Fig. 2 – Comparative Illustrations of Room Criteria (RC, left) versus Noise Criteria (NC, right). The "A" and "B" regions in the 16 – 63 Hz bands of the RC Chart indicate graduated levels of low frequency noise with increasing probabilities of inducing vibration into light weight structures.

Both NC and RC systems specify continuous background sound levels in each audible octave, due to building systems operations, to form appropriate background sound spectra with balanced spectrum and limited tonality. ASHRAE also indicates dBA and dBC criteria equivalents, which may be referenced where equipment manufacturers do not provide NC ratings. Requirements vary based on space functions and occupancies. Recommendations are shown in Table 3.

Transient disturbances, including exterior intrusions and other occupant-generated noise are not included in noise criteria, but are anticipated to add to the continuous background level, i.e., the criteria are designed to result in appropriate ambient sound levels when occupant generated noise is added to continuous background building systems noise. The families of graduated allowable spectrum levels relate to various functions in the building that have different speech communication, privacy or annoyance expectations.

Table 3 – Continuous Background Noise (RC/NC)*

Occupancy	Criteria**
Atrium, Lobby, Reception Desk	RC/NC 40
Corridors, Lobbies and Circulation	RC/NC 45
Exhibit Spaces (assumes A/V)	RC/NC 35
Public Assembly Pre-Function	RC/NC 35
Auditorium, >300 seats	RC 25
Video/Audio Teleconference	RC 25
Large A/V Conference, Training	RC/NC 30
Medium Conference, <50 seats	RC/NC 30
Small Conference, w/o A/V, Executive Office	RC/NC 30
Private Office,	RC/NC 35
Open Office,	RC/NC 40
Work, Copy, Mail, Utility	RC/NC 40
Break, Lounge, Dining, Reception	RC/NC 35
Fitness Facility with Music Capability	RC/NC 40
Child Care	RC/NC 35
Toilet Block	NC 45
Elec., IDF, Mech., Elev. Equip Room	NC 50
Server/Digital Equip Room / CRAC	NC 50/60
Parking Garage (ventilation)	NC 60

* Continuous building systems noise, excluding transients, occupant or user equipment noise.
** RC or dBC is preferred for sensitive rooms or loud low frequency noise-induced vibration.

4.2 Sound and Vibration Relationships

Loud low frequency sound can also induce lightweight structures into vibration, resulting in re-radiated sound reinforcement. The Room Criteria (RC) curves, Fig. 2, above, have regions on the upper left, labeled A and B, representing low frequency airborne sound levels that can acoustically induce vibration into lightweight materials, such as drywall partitions, glass windows and suspended ceilings. It is advisable to avoid very low frequency rumble from HVAC in occupied spaces to prevent fatigue and annoyance to occupants.

Conversely, vibration can generate perceptible audible surface-radiated airborne sound as shown on Perceptibility Chart[13], Fig. 3, which relate airborne sound in Room Criteria (RC) terms to vibration acceleration levels (dB, re: 1g) on surfaces, such as walls, doors, windows, etc.

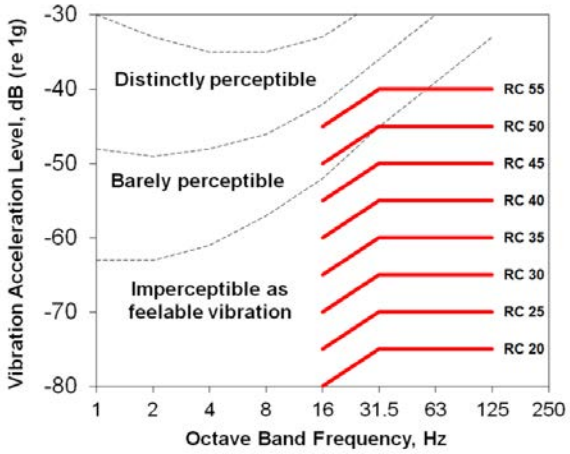

Fig. 3 –Surface vibration acceleration levels relationship with audible radiated sound

5 BUILDING VIBRATION AND MECHANICAL VIBRATION ISOLATION

5.1 Perceptible Vibration

Structure borne vibration may be "feelable" or perceptible to human tactile senses. Various levels of tactile perceptibility of vibration are shown in Figs. 3 and 4. Perceptible vibration can reinforce primary sound sources and can also "cue" human receiver senses to increase perception. Structures ideally are designed to limit vibration amplitude to "imperceptible." Surface vibration can also generate perceptible audible surface-radiated airborne sound, as described in 4.2 above.

5.2 Structural Building/Floor Vibration

Empirical studies have determined human sensitivities to vibration, both tactile and comfort. Quantitative reviews of sensitive equipment tolerances to vibration, as published by their manufacturers, have determined generic allowable floor or work surface vibration levels for sensitive facilities, such as research and hospital spaces. 1/3 octave RMS velocity level Vibration Criteria (VC)[14, 15], shown in Fig 4, may be considered for occupied spaces. Normal office floor velocity vibration is recommended < 400 μ–m/sec RMS (16 k μ–in/sec velocity RMS).

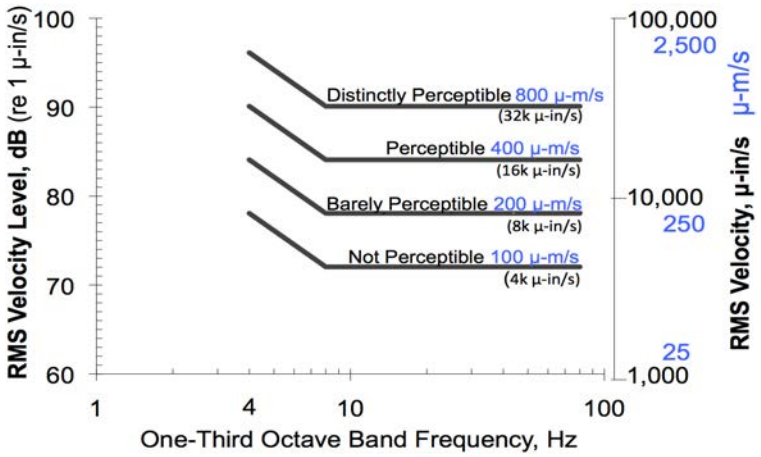

Fig. 4 –Permissible floor vibration, velocity RMS; Office 400 μ–m/sec (16k μ–in/sec).

5.3 Impact Transmission Limits

Floor impacts due to footfall, aerobic or fitness activities, dropped items, reciprocating building machinery or user-installed equipment should be limited to prevent audible radiated noise in occupied spaces below. Impact Insulation Class (IIC)[16] is a single-number laboratory rating for floor-ceiling assembly radiated noise caused by impact or vibration, somewhat like STC for airborne sound transmission. In-situ or field measured impact insulations are expected to be approximately 5 points less than laboratory ratings. Receiver recommendations are in Table 4.

*Table 4 – Impact Insulation Class (IIC)**

Occupied Space Function	Criteria**
General Use Occupied Spaces	IIC 40-50
Active Spaces with frequent impacts	IIC 50-60
Auditorium, >100 seats	IIC 60-65

* Impact Insulation Class (IIC) is a laboratory rating. In application, field measured IIC will normally be 5-10 points lower than laboratory IIC rating.

6 ENVIRONMENTAL NOISE

6.1 Outside to Inside Sound Transmission

Outside-to-Inside Noise Reduction: In addition to interior demising assembly sound transmissions, the exterior walls or building shell should limit intrusion of environmental noise. Actual noise reductions should be determined based on the difference between receiving room indoor background noise criteria and actual or anticipated typical outdoor sound spectrum levels at the building façade (during hours of use), so that intrusive transients do not exceed continuous ambient more than 5 dB for sound sensitive spaces, or up to 10 dB for non-sensitive corridor, work or utility spaces. Fig. 5, following page, shows Congress Ave. modification to the Texas Mall with its relationships to state office buildings that may be disturbed by outdoor amplified sound sources.

Outdoor-Indoor Transmission Class (OITC), Table 5, relates to control of airborne noise intrusion via exterior wall and roof assemblies considers source-path-receiver factors similar to STC, but with loss performance across a broader range of 1/3 octave bands, 80 Hz to 4000 Hz, to account for anticipated urban sound sources. In-situ or field-measured conditions may be anticipated to be 5 or more points lower. OITC criteria recommended below are based in part on environmental noise measurements that have been made near the Capitol Complex.

Table 5 – Outdoor-Indoor Transmission Class (OITC)*.

Interior Spaces Demised	Criteria
Atrium, Lobby	OITC 27
Exhibit Spaces (assumes A/V)	OITC 27
Public Assembly Pre-Function	OITC 27
Auditorium, >100 seats	OITC 35
Video/Audio Teleconference	OITC 35
Large A/V Conference, <100 seats	OITC 33
Medium Conference, <50 seats	OITC 33
Small Conference, Executive Office	OITC 30
Private Office,	OITC 27
Work, Copy, Mail, Utility	OITC 25
Break, Lounge, Dining, Reception	OITC 25
Toilet Block	OITC 23
Elec., IDF, Mech., Elev. Equip Room	OITC 20
Server/Digital Equip Room / CRAC	OITC 20
Fitness Facility	OITC 25
Child Care	OITC 30
Roof-Ceiling Demising	OITC 50

* OITC is a laboratory rating. In non-ideal conditions application values are normally de-rated 5 points.

STC criteria may also be used for the exterior shell if specific minimum frequency band transmission losses (TL) are also specified for typically prominent frequencies. For example, low frequency bus, motorcycle and truck noise and amplified music (bass) tends to be greatest in 80 Hz and 100 Hz 1/3-octave bands, respectively. Therefore, specify STC values 3-5 points greater than the OITC values shown above and place minimum 1/3 octave TLs not less than 20 dB at 80 and 100 Hz, or alternately, full (1/1) octave TL not less than 23 in 125 Hz band (which incorporates the 100 Hz 1/3 octave). The lack of very low frequency glazing performance data may limit usefulness of 63 Hz octave (50, 63 and 80 Hz 1/3 octaves) performance specification.

6.2 Property Boundary Limits

Environmental or outdoor sound levels may be limited by practical considerations, or by regulatory ordinance or code. A practical limit may be the transient sound level at the building façade that would increase interior sound level over allowable continuous interior noise criteria. Municipal codes and ordinances limit building systems equipment noise and amplified music or speech, respectively, at the property boundaries. Although the state is not required to meet municipal codes and ordinances, City of Austin codes were considered and coordinated with Master Plan design standards to the extent feasible. Regulatory limits may be written as: i) absolute or maximum instantaneous levels or ii) they may be integrated average or equivalent levels (Leq), which recognize levels that vary over time. Maximum instantaneous limits may be preferred for amplified music or other non-continuous, transient sources. Equivalent levels may be preferred for outdoor mechanical equipment, such as cooling towers, air-cooled condensing units or exhaust fans, that produce continuous or slowly modulating sources. Tonal sources, such as rotary helical or screw compressors are discouraged.

Sound level limits at property boundaries (sources):

- Good-Neighbor Policy: 75 dBC (preferred), 65 dBA (designer or operational discretion)
- Austin code: outdoor building equipment, 70 dBA
- Austin ordinance, Ch.9-2: amplified music, speech: < 83 dBA, varies by zoning, time of day

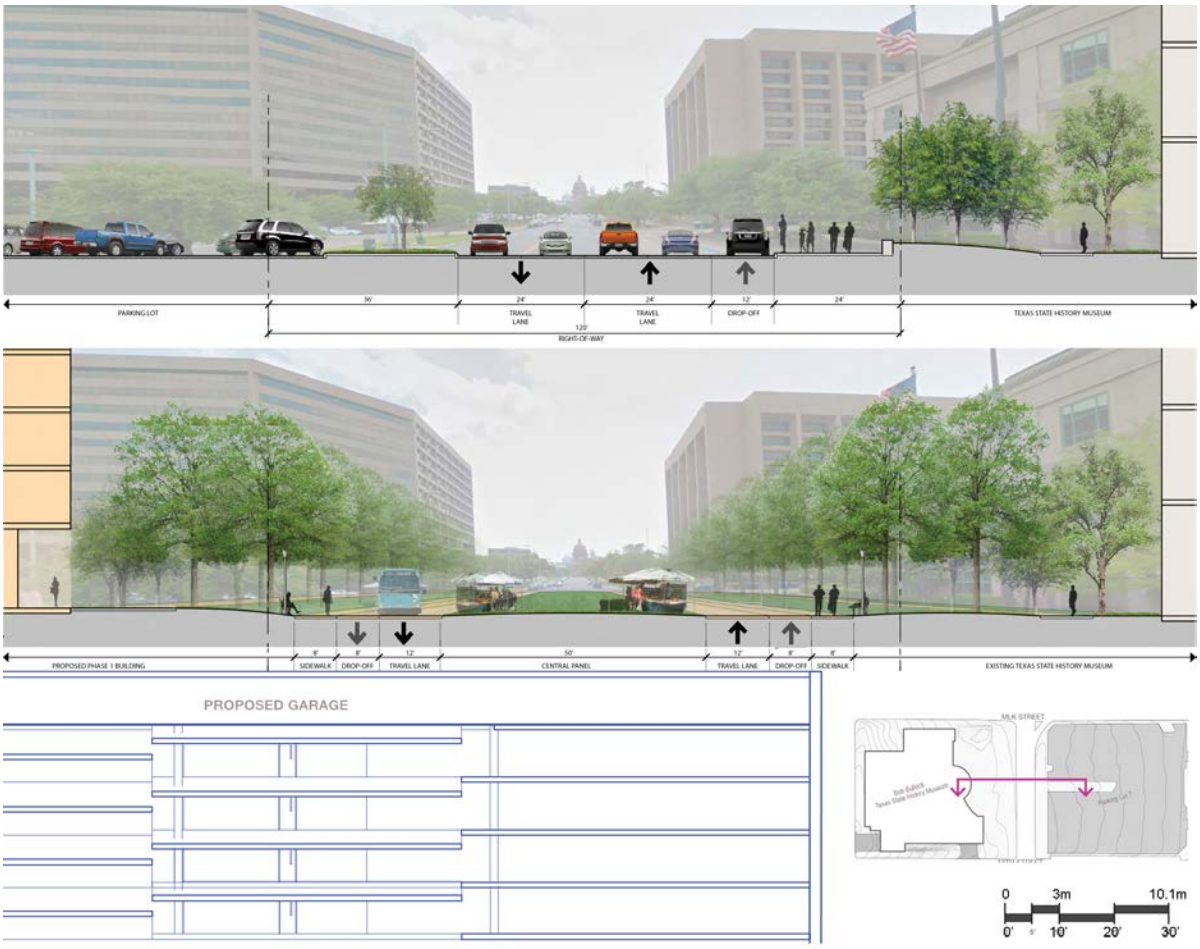

Fig. 5 – Existing Congress Avenue versus Proposed Texas Mall and Garage Sections[17]
Mall converts bi-directional street to boulevard with subterranean garage to replace surface parking.

6.3 Known Environmental Noise Levels

Noise monitoring conducted near the Capitol Complex prior to master planning, Fig. 6, provided model sound spectra for common urban noise source ambient background and transient disturbance levels, including street traffic and helicopters serving a nearby hospital. Transients, up to 70-80 dBA (L05 and L01) may occur several times per hour, peaking in 31 & 63 Hz bands.

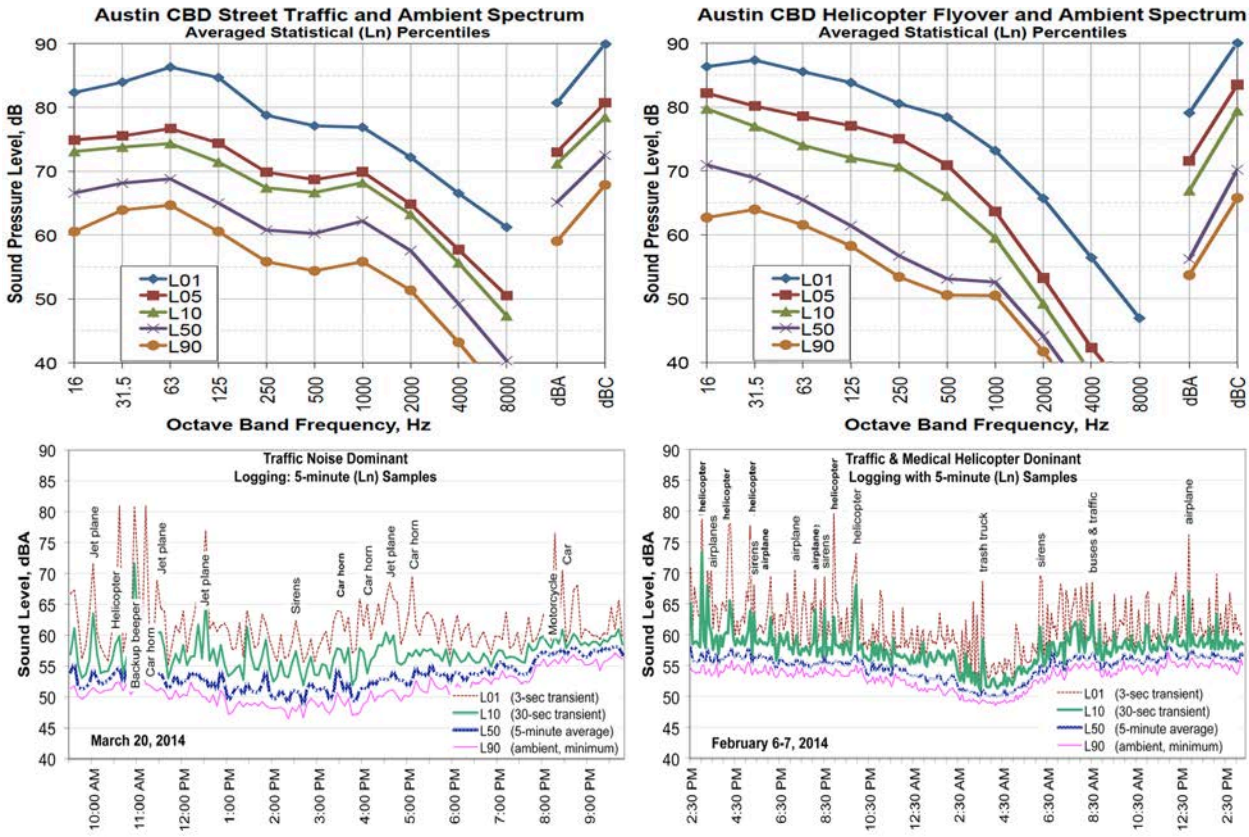

Fig. 6 – Environmental Noise Levels Near Capitol Complex: Statistical Spectra (Ln, top) and A-weighted (LAn, lower): Traffic dominant (left) and Helicopter dominant (right) [18].

6.4 Anticipated Capitol Complex Environmental Noise Sources

The Central Utility Plant will incorporate large refrigeration chillers and condenser cooling towers for a chilled water loop system that serves the buildings in the Complex. In addition, pump noise, emergency engine-generator and related mechanical and electrical sound sources will emit loud environmental noise levels, which should be attenuated to achieve < 70 dBA at property boundaries.

The outdoor stage venue at the 1801 Congress building across street from the Texas History Museum, and other temporary venues that may be erected on the Texas Mall, shown on Fig. 5, will produce amplified speech and music at moderately high levels. Directionality, sound control board limiters and other means of containing or limiting loudspeaker sound levels will be employed, Other outdoor sound sources include amenities, such as exterior play areas for child care facilities. Building façade designs and glazing specifications should anticipate potentially disturbing noise intrusions and be designed to achieve interior noise limit criteria.

7 CONCLUSIONS

The Texas Facilities Commiossion Capitol Complex Master Plan, completed by the Page A/E design team, is a comprehensive and coordinated set of design criteria, parameters and standards for each of the design disciplines. It encompasses history and culture of the state and the capitol city and incorporates considerations for architectural character and materials, building and facility massing and cores, surface amenities and venues, transportation and parking, infrastructure, building interior public (lower level) meeting, display, fitness, dining, child-care and other amenities plus upper level state office and conference spaces. The Acoustical Criteria and Design Standards are integrated with all disciplines' design standards for implementation by Architects and Engineers of record in detailed design construction documentation.

The final version of the Pre-Conceptual Design Report, which contains Criteria, Design Standards, and Preliminary Conceptual designs for The Mall, CUP, Infrastructure and Office Buildings at 1601 and 1801 Congress Avenue, is at: https://tfc.egnyte.com/dl/qlIdH2TJBA

In early 2018, public Architect-Engineer design team selection processes commenced for the detail design commissions of the Phase 1 CUP, Mall, Infrastructure and Office Buildings.

8 ACKNOWLEDGEMENTS

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